

## WHAT IS CLAIMED IS:

1. A method for analyzing materials in an object, said method comprising:

acquiring x-ray projection data of the object at high energy and at low energy for a plurality of views;

utilizing the acquired x-ray projection data in a material decomposition to determine material densities at each pixel for two selected basis materials;

determining a composition of an object at each pixel utilizing a determined mapping of material density regions for the two selected basis materials; and

displaying an image indicative of the composition of the object utilizing the determined composition.

2. A method in accordance with Claim 1 wherein said acquiring of x-ray projection data comprises performing a computed tomographic scan of the object.

3. A method in accordance with Claim 1 wherein said utilizing the acquired x-ray projection data in a material decomposition to determine material densities at each pixel for two selected materials comprises performing a table lookup.

4. A method in accordance with Claim 1 wherein said selected materials are water and iodine.

5. A method in accordance with Claim 1 wherein said selected materials are preselected, and said determined mapping of material density regions is a predetermined mapping.

6. A method in accordance with Claim 1 wherein said selected materials are predetermined, said determining a composition of an object at each pixel utilizing a predetermined mapping of material density regions for the two preselected materials comprises determining which of a plurality of rectangular regions in a

Cartesian coordinate system contains said determined material densities, and selecting the determined composition in accordance with said determined rectangular region.

7. A method in accordance with Claim 1 wherein said selected materials are predetermined, and wherein determining a composition of an object at each pixel utilizing a predetermined mapping of material density regions for the two preselected materials comprises determining a ratio of said determined material densities, and selecting the determined composition in accordance with said ratio.

8. A method for analyzing materials in an object, said method comprising:

acquiring x-ray projection data of the object at high energy and at low energy for a plurality of views;

utilizing the acquired x-ray projection data in a material decomposition to determine material densities at each pixel for two selected basis materials;

utilizing a determined mapping of material density regions for the two selected basis materials, filtering pixels of an image of the object corresponding to one or more compositions of interest; and

displaying an image indicative of the locations of composition of interest of the object.

9. A method in accordance with Claim 8 wherein said acquiring of x-ray projection data comprises performing a computed tomographic scan of the object.

10. A method in accordance with Claim 8 wherein said utilizing the acquired x-ray projection data in a material decomposition to determine material densities at each pixel for two selected materials comprises performing a table lookup.

11. A method in accordance with Claim 8 wherein said selected materials are water and iodine.

12. A method in accordance with Claim 8 wherein said selected materials are preselected, and said determined mapping of material density regions is a predetermined mapping.

13. A method in accordance with Claim 8 wherein said selected materials are predetermined, said determining a composition of an object at each pixel utilizing a predetermined mapping of material density regions for the two preselected materials comprises determining which of a plurality of rectangular regions in a Cartesian coordinate system contains said determined material densities, and selecting the determined composition in accordance with said determined rectangular region.

14. A method in accordance with Claim 8 wherein said selected materials are predetermined, and wherein determining a composition of an object at each pixel utilizing a predetermined mapping of material density regions for the two preselected materials comprises determining a ratio of said determined material densities, and selecting the determined composition in accordance with said ratio.

15. A method in accordance with Claim 8 wherein the object comprises a blocked lumen, and said image indicative of the locations of composition of interest of the object comprises an image indicative of locations of blockage in the blocked lumen.

16. An apparatus for analyzing materials in an object, said apparatus comprising an x-ray source and a detector configured to acquire projection data at high and low energies for a plurality of views, a computer, a storage device, and a display, said apparatus configured to:

acquire x-ray projection data of the object at high energy and at low energy for a plurality of views utilizing said x-ray source and said detector;

process the acquired x-ray projection data utilizing said computer and said storage device to determine material densities at each pixel for two selected basis materials;

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determine a composition of an object at each pixel utilizing said computer and a determined mapping of material density regions for the two selected basis materials in said storage device; and

utilize said display to display an image indicative of the composition of the object utilizing the determined composition.

17. An apparatus in accordance with Claim 16 wherein said x-ray source and said detector are on a rotating gantry, and to acquire of x-ray projection data, said apparatus is configured to perform a computed tomographic scan of the object.

18. An apparatus in accordance with Claim 16 wherein to utilize the acquired x-ray projection data to determine material densities at each pixel, said computer is configured to perform a table lookup.

19. An apparatus in accordance with Claim 16 wherein said selected materials are preselected, and said determined mapping of material density regions is a predetermined mapping.

20. An apparatus in accordance with Claim 16 wherein said selected materials are predetermined, and to determine a composition of an object at each pixel utilizing a predetermined mapping of material density regions for the two preselected materials, said computer is configured to determine which of a plurality of rectangular regions in a Cartesian coordinate system contains said determined material densities, and to select the determined composition in accordance with said determined rectangular region.

21. An apparatus in accordance with Claim 16 wherein said selected materials are predetermined, and to determine a composition of an object at each pixel utilizing a predetermined mapping of material density regions for the two preselected materials, said computer is configured to determine a ratio of said determined material densities, and to select the determined composition in accordance with said ratio.

22. An apparatus for analyzing materials in an object, said apparatus comprising an x-ray source and a detector configured to acquire projection data at high and low energies for a plurality of views, a computer, a storage device, and a display, said apparatus configured to:

acquire x-ray projection data of the object at high energy and at low energy for a plurality of views utilizing said x-ray source and said detector;

process the acquired x-ray projection data utilizing said computer and said storage device to determine material densities at each pixel for two selected basis materials; and

utilize said computer and a determined mapping of material density regions for the two selected basis materials in said storage device to filter pixels of an image of the object corresponding to one or more compositions of interest; and

utilize said display to display an image indicative of the locations of composition of interest of the object.

23. An apparatus in accordance with Claim 22 wherein said x-ray source and said detector are on a rotating gantry, and wherein to acquire x-ray projection data, said apparatus is configured to perform a computed tomographic scan of the object.

24. An apparatus in accordance with Claim 22 wherein to utilize the acquired x-ray projection data in a material decomposition to determine material densities at each pixel for two selected materials, said computer is configured to perform a table lookup.

25. An apparatus in accordance with Claim 22 wherein said selected materials are preselected, and said determined mapping of material density regions is a predetermined mapping.

26. A method in accordance with Claim 22 wherein said selected materials are predetermined, and to determine a composition of an object at each pixel

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utilizing a predetermined mapping of material density regions for the two preselected materials, said computer is configured to determine which of a plurality of rectangular regions in a Cartesian coordinate system contains said determined material densities, and to select the determined composition in accordance with said determined rectangular region.

27. An apparatus in accordance with Claim 22 wherein said selected materials are predetermined, and to determine a composition of an object at each pixel utilizing a predetermined mapping of material density regions for the two preselected materials, said computer is configured to determine a ratio of said determined material densities, and to select the determined composition in accordance with said ratio.